NCSX

Scope/Cost Reduction Studies

Wayne Reiersen (PPPL)

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PPPL

Objective

Reduce the project cost and accelerate the schedule to first plasma

A two pronged approach is envisioned…

Value engineer the project scope

- **Review the physics requirements and identify design impacts**
- **Identify modifications to the requirements for reducing the cost and accelerating the schedule**

Make it better, faster, cheaper

- **Develop methods and cost/schedule estimates for fabrication and assembly up front**
- **Identify cost/schedule drivers**
- **Identify design alternatives for reducing the cost and accelerating the schedule**

Value Engineering the Project Scope

Initial physics requirements drafted 9/9 by Zarnstorff

Design impacts will be evaluated at the system level (configuration impacts) and subsystem/component level (design, fabrication, and assembly impacts)

Next Steps:

1. **Identify system level configuration impacts (Reiersen, 10/9)**
2. **Flow down top-level physics requirements to subsystem level (Reiersen, 10/23)**
3. **Identify design, fabrication, and assembly impacts at subsystem/component level (Cognizant engineers, date TBD – WBS 1 first, others to follow)**

Obvious high leverage requirements (2T operation, 350°C bakeout, and liner conductance) have already been identified to cog engineers for their evaluation *in the context of the reference engineering design*

Reference Engineering Design

Based on a 2-period plasma configuration (d9e)

- Provided the basis for current cost and schedule estimates
- Is the only basis we now have for assessing design, cost, and schedule impacts
- Does not work – fails to meet current physics requirements
- Designs that would work might be qualitatively different (3 or 4 periods with monotonic or high shear) – extrapolation of design impacts?
- Needs to be updated

Developing a design that does work ought to be our top priority

- Developing a <u>better</u> (cheaper, faster) solution is meaningless until we have <u>a</u> solution
- Value engineering requirements and making it faster, better, cheaper should be a lower priority– but still a parallel activity

Making It Better, Faster, Cheaper

It is essential that methods for fabrication and assembly be explored <u>early</u> to…

- **establish feasibility and**
- **tailor the requirements and designs for use of cost effective materials and processes**

Early implementation of design changes minimizes downstream impacts

Focus of work in FY98 has been on in-vessel modifications (WBS 1) and power systems (WBS 4)

WBS 1 And WBS 4 Account for Most of the Project Cost

WBS	Description	Cost (M$)
1	*Torus System Modifications*	*14.1*
2	Auxiliary Heating Systems	1.4
3	Fueling and vacuum Systems	0.1
4	*Power Systems Modifications*	*3.5*
5	Utility Systems Modifications	0.3
6	Central I&C and Data Acquisition	2.0
7	Diagnostic Systems Modifications	1.3
8	Site Preparation and Facility Startup	1.4
9	Project Oversight and Support	4.5
	Subtotal	28.5
	Contingency	6.7
	Total	35.3

Fabrication and assembly of in-vessel modifications has been investigated by ORNL and will be reported on this afternoon

- **Non-axisymmetric coils and supports (Williamson)**
- **Liner (Goranson)**
- **Assembly (Cole)**

Utilization of TFTR power supplies at C-site (versus buying new power power supplies) has been investigated by Hatcher and will also be reported this afternoon (Reiersen)

Generally, the signs of the WBS 1 and WBS 4 cost and schedule impacts are neutral or favorable

The focus in FY99 will continue to be on WBS 1 – first, to make it work and second, to make it better, faster, cheaper